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REVIEWS.

Geschichte, Theorie und Technik der Statistik. Von AUGUST MEITZEN, Ph.D., Professor an der Universität zu Berlin. Berlin, Verlag von Wilhelm Hertz, 1886. — 8vo, ix, 214 pp.

Jubilee Volume of the Statistical Society, June 22–24, 1885. London, Edward Stanford, 1885. — 8vo, xv, 372 pp.

Le 25 Anniversaire de la Société de statistique de Paris, 1860–1885. Paris, Berger-Levrault et C^{ie}, 1886. — 8vo, xii, 444 pp.

Bulletin de L'Institut international de statistique. Tome 1, 1^{re} et 2^{me} Livraisons, Année 1886. Rome, Imprimerie Héritiers Botta, 1886. — 8vo, 288 pp.

There has occurred during the last few years a distinct revival of interest in the study of statistics. This has shown itself in the very successful anniversary meetings of the London and Paris statistical societies, in the foundation of the International Statistical Institute and in renewed critical attempts to define the scope and method of statistics as a science. The four volumes given above are the first fruit of this revival, and — almost a library in themselves — furnish a new and valuable basis for the study of the history, theory, method and practical results of statistics according to the latest scholarship. It is proposed in the following review to point out what this basis is, to explain the modern conception of statistical science and to give an analysis of the new material offered us in these volumes, so far as it is of scientific interest.

The history of statistics ¹ is a very curious one. It started as a purely practical branch of administration; developed into what we would now call descriptive sociology; was then differentiated from political science, geography and political economy, and assumed the position of a particular scientific method — or, according to others, of a special branch of social science using a particular method. At the same time its opera-

¹ The first part of Meitzen's book is an admirably clear and concise history of statistics both theoretical and practical. The Jubilee and Paris volumes contain histories of the two societies. The third part of the Paris volume contains an invaluable series of papers by officials describing the statistical bureaux of Europe. See also Neumann-Spallart's history of the statistical congresses in the Jubilee volume, and his opening address before the International Institute at Rome in the *Bulletin*.

tions have increased enormously, so that its administrative character has returned to it strengthened a hundred fold.

Enumerations of the people are as old as the history of Egypt, Judea, China, Persia, Greece and Rome. Through the middle ages we find statistical surveys of property and enumeration of possessors such as Domesday book in England and the *Grundbücher* of Germany. As powerful states grew up, administrative measures for military and financial purposes demanded statistical knowledge of the resources of the state, and the official statistics were greatly extended. These efforts were encouraged by such monarchs as Louis XIV and Friedrich II, and resulted in the establishment of bureaux of statistics in all the principal European states about the beginning of this century.

In the meantime the purely administrative statistics were brought into scientific form at German universities ; first by Conring at Helmstedt in 1660, and later by Achenwall at Marburg in 1746. Statistics, as read by these German professors and their followers, meant what we call descriptive sociology or comparative political science, and included a description by words as well as by figures of all the important institutions of a state. The field was too broad, and the development of political science, political economy, administrative law and geography made the treatment by the older statistical science superficial. The method of description by words was a false one, because it failed to distinguish statistics from history and other branches of social science which covered the same field. The way out of this difficulty was suggested by the mathematicians, who declared that the real mark of statistics was the employment of figures and that description by words was altogether out of place. This certainly served to distinguish statistics from history and from descriptive social and political science, but it left to statistics only the barren and ungrateful task of drawing up tables of figures, without allowing the science to say what those tables meant or proved. The statistician was neither the Paul that planted nor the Apollos that watered the garden of human knowledge, nor was he to enjoy the increase. This view has found favor in England down even to the present day and was expressed as late as 1881 by Mr. Wynnard Hooper in a paper read before the London Statistical Society. Mr. Hooper said that statistics always meant statistics of something, as so many bags of coffee in the London warehouses, and that we could only speak of statistical science in the sense that we can speak of a science of microscopy, — that is, skill in using and manipulating an instrument.¹

The continental statisticians were not content with this position.

¹ Mr. Hooper has just reiterated these views in the article on statistics in volume xxii of the *Encyclopædia Britannica*, 1887.

Under the influence of the talented and enthusiastic Quetelet, — who declared that the regularities of human society, even in such phenomena as crime, equalled the regularities of purely physical occurrences, — they re-vindicated for statistics the position of a science. Quetelet's views, which seemed to set statistics in the place of social science and to destroy freedom of the human will, have indeed been very much modified by later statisticians, who do not assert of social laws that they have the inevitable and unchangeable character of natural laws ; but they have shown that the statistician is not merely an enumerator but an investigator in social science, who both chooses his own field of investigation and works out his own results. He does this by the employment of a particular method, *viz.* the statistical.

The statistical method is the observation of numerous instances. This method gives us knowledge of the facts of human society which can be gained in no other way. The facts thus gained are of different kinds. Some are merely descriptive ; as for example the number of people on the face of the earth, their increase or decrease, their distribution by age, the birth-rate, *etc.* These are generally of local interest only and their determination cannot raise statistics to the rank of a science. It is mere enumeration. In the second place, statistics give us a clue to certain regularities in the physical life of man which empirical observation would never determine ; for instance, the excess of male births over female, the frequency of multiple births, the average duration of life. Finally, statistics are used to show the causal connection between groups of social phenomena ; as between illegitimate births and infant mortality, illiteracy and crimes against the person, advanced social position and small families. In order to do all this the statistician must be something more than a tally-sheet. He must be a social scientist. He must know what it is worth while to investigate, what it is practicable to investigate and what truth, if any, is demonstrated by the investigation. It would be logically possible to conceive of the statistician as gathering data on orders received from the social scientist, and then turning these data over to the latter for use, without knowing what was the object of the investigation or explaining the conclusions to be drawn. In fact, statistics are too often treated in this way — as unvarying quantities to be used by any person for any purpose. Experience has proved, however, that the statistician cannot be divorced from the scientist. For unless the statistician have some knowledge of the end to be attained he will work in the dark and perhaps neglect the collation of the very facts which would be of most value. And unless the scientist have some familiarity with statistical methods and previous statistical investigations, he may place false values on the figures or be led astray by accidental regularities or irregularities due to local or temporary causes.

Modern statisticians, however, differ as to whether statistics, even in this widest meaning, ought to receive the name of a science or whether it is simply a method. The difficulty of calling it a science is that statistics play an important role in so many sciences, both natural and social. We may have statistics in astronomy, in botany, or in meteorology (average temperature, *etc.*). On the other hand, the use of the statistical method in natural science is altogether subordinate; while in social science it occupies by itself a distinct and unique position. In social science it stands by the side of the historical and comparative methods as a third way of gaining knowledge of human life in society. History and comparison of institutions may give me qualitative measurements of cause and effect in the forces governing social life; statistics give me quantitative measurements. But the question of nomenclature is really of very little importance. If history and comparative constitutional law may be termed sciences, so may perhaps statistics. Professor Meitzen ingeniously suggests that it is a branch of applied inductive logic; but even logic is sometimes called a science.¹

Whether method or science, modern statistics busies itself especially with problems of social science. This is admirably shown by the collections of papers in the volumes of proceedings before us. The favorite field of statistics is the study of population.² In scarcely any other direction is there so much room for numerical analysis. Statistics presents the increase or decrease of population; its density and geographical distribution; its distribution by sex and age; the facts about births, marriages and deaths; and even certain physical peculiarities, such as the height of men. Then there are certain facts connected with population of very great interest, such as emigration, education, and matters of similar character.³ Closely connected with these facts are those showing the economic condition of the people, especially the increase and

¹ The second part of Meitzen's book is an elaborate discussion of statistical method and technique. See also, in the Jubilee volume: Edgeworth, *Methods of Statistics*; Levasseur, *La statistique graphique*; Marshall, *On the Graphic Method of Statistics*.

² In the Jubilee volume see: Price-Williams, *Remarks on Diagrams illustrative of the Population of London*. In the Paris Anniversary volume see: Loua, *Les accroissements de la population en France depuis le commencement du siècle*; Turquan, *De la répartition géographique et de la densité de la population en France*; Levasseur, *Histoire de la natalité française*; Kiaër, *La fécondité du mariage*. In the *Bulletin* of the International Institute see: Beloch, *La popolazione di Roma antica*; Perozzo, *Della composizione della popolazione per sesso e per età in Italia ed in alcuni Stati esteri*. See also, in the Paris volume, Bertillon, *La taille de l'homme en France*.

³ See in the *Bulletin* of the International Institute: Dell' emigrazione dall' Italia comparata a quella che avviene da alcuni altri Stati europei; *Confronti internazionali sull' istruzione elementare della popolazione*.

distribution of wealth.¹ Finally we have a very active effort to advance statistical science by gathering international statistics and making them comparable with one another.² It is only in this way that statistics can ever discover social laws ; and it is to be hoped that the new Statistical Institute will accomplish in this direction what the old statistical congresses aspired but failed to do.

The modern conception of statistical science is, therefore, that it is a branch of social science employing a particular method. This method is to be used with scientific care and subjected to the most rigorous analysis and criticism. It is then to be applied to the phenomena of human life so as to give us knowledge of society and of social laws. Observations are to begin in single countries and for particular purposes, but are then to be made international and extended to all domains of social life capable of observation in this way. The mass of knowledge thus obtained, the truths disclosed by this knowledge and the scientific appreciation of the method will constitute a statistical science.

RICHMOND M. SMITH.

Les Salaires au XIX^e Siècle. Par ÉMILE CHEVALLIER. Paris, Arthur Rousseau, 1887.

This work of 300 pages received the prize of 2500 francs in 1886 from the French Academy of Moral and Political Sciences as the best work submitted on wages, the subject assigned for the competition. It impresses the reviewer, after careful reading, as the ablest work on the subject since Walker's *Wages Question*.

The first half of the book is devoted to a close study of a vast mass of facts bearing on the height of wages and cost of living in the last three centuries, but particularly since 1820, in France, Germany, England, the United States, and Australia. The figures in most cases are not new ; but as regards France, M. Chevallier presents from his own

¹ See in the Paris volume: Fournier de Flaix, L'accroissement de la richesse depuis 1789 en France, en Angleterre et en d'autres Etats; Leemans, Quelques progrès en Belgique; Juglar, Des retours périodiques des crises commerciales et de leurs liquidations. In the *Bulletin*, see: Foville, La statistique de la division de la propriété en France et dans la Grande-Bretagne; Sbrojavacca, Sul valore della proprietà fondiaria rustica e sulla gravanza delle imposte che la colpiscono in alcuni Stati; Rauchberg, Die Entwicklung des Clearing-Verkehrs.

² See in Jubilee volume: Jeans, on Uniformity of Statistics; Körösi, on the Unification of Census Record Tables; Körösi, Mémoire relativement aux décisions des Congrès Internationaux de Statistique, concernant le questionnaire international des recensements. In the *Bulletin* see: Rawson, International Statistics, illustrated by vital statistics of Europe and of some of the United States of America. Many of the papers already cited are international in character.